

Personality Symptoms and Self-Esteem as Correlates of Psychopathology in Child Psychiatric Patients: Evaluating Multiple Informant Data

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Abstract Research on adulthood posits personality and self-esteem as important predictors of psychopathology. In childhood, however, the study of these relationships is complicated by the lack of consensus on how to combine data from multiple informants of child behavior. This study evaluates the relationships among personality symptoms, self-esteem and psychopathology in 60 child psychiatric patients ($M_{\text{age}} = 10.6$) using principal component analysis (PCA) to aggregate data from multiple informants and compares this strategy with a single informant approach. When predictor and criterion measures were rated by a single informant, strong and differential relationships between personality symptoms, self-esteem and psychopathology are found. When multiple informant data were combined into composite scores by PCA, correlations decreased but remained significant. Hierarchical regression analyses affirm the robustness of the following pattern: Emotional Instability, Introversiveness and Global Self-Esteem are associated with internalizing whereas Disagreeableness and Behavioral Conduct primarily relate to externalizing problems.

Keywords Personality · Self-esteem · Psychopathology · Problem behavior · Multiple informants

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Introduction

Individual differences in personality and self-esteem relate in complex ways to psychopathology. A substantial body of literature on adults reveals that personality, as conceptualized by the Five-Factor Model [1], is significantly associated with symptoms of psychopathology in both clinical and non-clinical samples [2]. Adult's low self-esteem is also considered as an essential feature of clinical disorders such as depression [3]. Given that both personality and self-esteem are rather stable over time [4, 5], it is not surprising that childhood researchers increasingly investigate children's maladjustment as related to these stable individual differences [e.g., 6, 7]. However, the integration and accumulation of this literature is seriously complicated by the lack of consensus on how to combine data from multiple informants assessing children's traits and behavior.

Young children cannot give a full and reliable account of their own functioning and therefore this kind of research requires a multi-axial approach gathering information from multiple sources [8, 9]. Yet, when multiple informants are consulted, researchers and clinicians often have to cope with only low to moderate agreement among judges as average inter-informant correlations typically range between 0.25 and 0.35 [8–10]. The consequences of this low inter-agreement have been primarily articulated in the assessment of childhood dysfunction because numerous studies demonstrated that prevalence rates for most childhood disorders markedly depend on the particular type of informant [8–12]. Moreover, inter-informant discordance is also a well-documented phenomenon in both personality and self-esteem assessment literature [13–15] and hence, fundamentally affects the investigation of the relations between personality, self-esteem and childhood psychopathology.

Researchers focusing on personality and self-esteem as indicators of childhood psychopathology are generally more interested in assessing the actual characteristics of the child rather than the informant's perceptions of these characteristics. However, as there is no established method to combine multiple informant data, conclusions may depend on the chosen informant strategy. More in particular, informant strategies can either obscure or overstate the case for personality and self-esteem as major predictors of childhood psychopathology.

Informant Strategies Influence Effects of Personality on Psychopathology in Children

The past decades, personality psychologists achieved consensus that the Five-Factor model (FFM) also provides a valid framework to describe behavioral individuality among children and adolescents [4, 6, 16, 17]. Based on this 'little five' [16] taxonomy and its accompanying assessment procedures for child personality, several studies now document that some personality traits play a prominent role in the expression of child and adolescent psychopathology [16–30]. A marked pattern emerges from this literature that appears to be rather independent on the type of sample, informant or instrument. This pattern suggests that higher Neuroticism and lower Extraversion are the primary markers of internalizing problems, while low scores on Agreeableness and Conscientiousness are primary indicators of externalizing problems. Openness to experience, the fifth FFM personality dimension, does not seem to be a consistent predictor of childhood problems.

However, almost all childhood personality-psychopathology research explored these relations based on data provided by a *single informant* [17–25], mainly relying on maternal ratings of both the predictor and the criterion variables [17–23]. As a result, the strengths of the reported correlations are likely to be inflated by common rater bias. In addition, some

question the validity of mothers as the most optimal informants of childhood personality and/or problem behavior. With regard to personality, there is some evidence that, prior to adolescence, children have difficulties providing accurate self-reports on personality traits and hence adult informants are to be preferred [15]. However, research established validity for parent, teacher as well as self ratings of problem behavior, although this depends on the outcome considered [8, 9]. Parents and teachers are generally better informants of externalizing behavior, while children, particularly as they get into adolescence are better informants of internalizing problems. In addition, teachers may not differentiate as much as parents but they add a unique perspective as they observe children in structured settings allowing comparison of the child with its peers [8, 9]. Hence, including multiple informants, especially for the assessment of problem behavior, may increase the reliability and validity of the studied personality and psychopathology relationships.

Notably, very few studies related assessments made by *multiple informants*, hence including between-rater variance, although this strategy was the one adopted by the ‘discoverers’ of the little five in children, John and colleagues [16]. These researchers were the first to document theoretically meaningful links between maternal ratings of personality and teacher reports of behavior problems. Only two other studies replicated and extended this informant approach by *simultaneously* reporting common-rater and cross-informant correlations [17, 18]. Unfortunately, this strategy showed that correlations dramatically dropped when assessments are based on different informants and yielded different outcomes for the various sources. Moreover, as this strategy includes multiple comparisons, the likelihood of type I errors (false positives) potentially threatens the validity of conclusions derived from the correlation matrices [12].

An additional issue in the study of childhood personality and psychopathology is to what degree ‘adaptive’ personality variation can account for the broad range of trait-related pathology represented by clinic-referred children and adolescents. In the few studies addressing clinical samples [18, 23, 25], referred children are rated high on Neuroticism and low on Extraversion, Agreeableness and Conscientiousness. However, the variation at the extreme poles may not be adequately captured by an instrument designed to assess adaptive personality variance. For that reason, De Clercq, De Fruyt and Mervielde recently developed the Dimensional Personality Symptom Item Pool for Children [DIPSI; 31, 32], an age-specific taxonomy assessing trait-related maladaptive functioning. This taxonomy proposes four higher-order dimensions that closely resemble the extremes of four of the five adaptive personality factors: Disagreeableness, Emotional Instability, Introversion and Compulsivity. To date, validation studies of the DIPSI identified Emotional Instability and Introversion as major correlates of internalizing and Disagreeableness as the prime correlate of externalizing problems [31, 32]. However, as these studies exclusively relied on maternal ratings to assess both predictor and criterion variables, common rater bias may also overstate these documented relationships.

Informant Strategies Shape Effects of Self-Esteem on Psychopathology in Children

In contrast to personality literature, research linking self-esteem to psychopathology mainly relates *child* reports of self-esteem to *parental* reports of problem behavior. Noticeably, this literature demonstrates that self-perceived self-concept, e.g., as assessed by the widely-used Self-Perception Profile Scale for Children [SPPC; 33], is not [34] or only weakly [7, 35] associated with parent-reported psychopathology. The two latter studies report that, in community samples, lower self-perceived Global Self-Worth is linked to more parent-reported internalizing problems. Muris [7] additionally reports that

externalizing problems go together with a more global profile of lower self-perceived competences.

Although it is argued that other informants, particularly parents, can give a valuable perspective on children's competence [14, 33], we identified only one study that reported both common-rater and cross-informant correlations. With a small sample of chronically ill adolescents, Aasland and Diseth [36] found that low Global Self-Worth was strongly related to internalizing problems, when assessed by one single rater. Again, the magnitude of these correlations dropped substantially when self-reports were linked to parent reports.

Integrating Multiple Informant Perspectives

Taken together, adopting multiple observers for personality, self-esteem and psychopathology is desirable from a scientific perspective but integration of divergent reports into a valid estimate of children's characteristics is not evident as the literature points out various discrepancies between raters. Moreover, research also indicates that informants share certain biases. Social desirability, halo-effects, confirmation, evaluative and memory biases [15], and in addition effects of judges' own psychopathology [37], personality [38] or self-esteem [39], all contribute to inconsistent and conflicting assessments of personality, self-esteem, and psychopathology.

Yet, these discrepancies and biases are basic ingredients of an ambiguous world, stemming from different observer perspectives, attitudes and contexts. Nevertheless, one can assume that even an ambiguous reality has a certain common radix. Hence, relying on the *common core* of ratings rendered by different informants may provide the best route to a more reliable and valid assessment of associations. This strategy has been clearly articulated for personality assessment [13], but might also be useful to integrate varying assessments of psychopathology which are believed to be constrained by cross-situational variability [8, 9].

In the literature, we identified three aggregation strategies to empirically grasp this common core of informant agreement. First, one might consider *pooling strategies*, wherein ratings from multiple judges are combined at the item level into a single subject variable. These strategies are particularly pertinent in diagnostic applications as clinicians need to classify children into categories of psychiatric disorder. To date, a variety of pooling algorithms is introduced, such as the *OR* algorithm wherein a symptom is considered present if it is endorsed by any informant [40], the *AND* algorithm wherein all judges must report sufficient numbers of symptoms before the child is considered a case [11, 41], and algorithms classifying different combinations of subclinical and clinical syndrome scores into diagnostic categories [42]. However, these pooling methods result in a considerable and uncontrolled loss of rater-specific information. Moreover, this method becomes impractical when informants use partly dissimilar instruments such as, for instance, the parent and teacher versions of Achenbach's System for Empirically Based Assessment [9].

A second strategy is based on *averaging* of ratings made by different judges using the same instrument, e.g., mother-self [26] or father-mother [27, 28] ratings on problem behavior. Although this averaging strategy is rather popular, it entails combining measurement error in addition to attributing equal weights to each informant. Moreover, averaging scores from multiple informants demands substantial agreement among the various informants but there is no generally accepted norm about the required level of agreement. As a result, the correlation between averaged scores varies widely from study to study and leads to divergent results. Hence, we consider this strategy as suboptimal.

Finally, a more recent approach involves the use of principal component analysis (PCA) as a means to extract the common core of scores provided by different pairs of raters [12, 29, 30]. PCA is a statistical model that transforms multiple scores into linear combinations of orthogonal latent variables in order to obtain a more parsimonious representation whilst preserving most of the originally included information. As an application, one can consider each informant's report of a target behavior as one of p variables. PCA represents the correlation matrix of these p variables by a linear combination of orthogonal latent variables. Presuming that each source provides reliable and at least minimally valid data on the target behavior, the first principal component extracts the communality across these informants. The first principal component extracts this common content whilst weighing each informant's data according to its loading on the common component. This component hence corresponds to a multi-informant estimate of the target behavior reflecting the common core of agreement which is less affected by rater-dependent variability and measurement error than any single informant's measure [12]. To date, two studies adopted this PCA-strategy to obtain more valid assessments of problem behavior in the relationship with personality [29, 30]. Yet, more research is needed to evaluate this strategy within clinical samples relating a broader variety of trait variables to psychopathology.

In the present study, we examine the benefits of the principal component analysis strategy to aggregate data from multiple informant data relative to the traditional strategy of relying on a single informant to study associations between personality symptoms, self-esteem and psychopathology in a child psychiatric sample. Additionally, we compare the incremental validity of personality symptoms and self-esteem as predictors of internalizing and externalizing behavior, based on these two strategies.

Methods

Participants

Participants were sixty children admitted to the Child and Adolescent Psychiatric Unit of a large university hospital, both in the ambulant (70%) and residential (30%) unit. The children, their parents and teachers all completed the questionnaires as part of the intake procedure. Ninety-two per cent of the children had not yet received treatment in this centre. The sample included 42 boys and 18 girls with a mean age of 10.6 years ($SD = 2.09$, range from 7 to 15). For eighty per cent of the sample, intelligence data on the Wechsler Intelligence Scale for Children [WISC-III; 43] were available. The mean IQ of these children was 97 ($SD = 19$).

The child patients represented a broad range of psychiatric disorders, including internalizing syndromes like depressive (20%) and anxiety disorders (10%), as well as externalizing conditions such as attention deficit hyperactivity disorder (23%), oppositional defiant (8%) and conduct disorder (12%). Twelve per cent of the children were diagnosed having pervasive developmental disorders. Other diagnoses included posttraumatic stress (3%) and adjustment disorders (3%), anorexia nervosa (3%), tic disorder (2%) and learning disorder without mental retardation (2%). Only one child received no psychiatric diagnosis. All diagnoses were made by child psychiatrists based on a site-specific, DSM-IV-based semi-structured interview and the multi-disciplinary record. The latter includes a standardized assessment protocol realized by a multi-disciplinary team (this team is led by a

child psychiatrist and includes a psychologist, social worker, speech and language pathologist, schoolteacher, and a nurse). Comorbidity between disorders within the sample was high: 37% of the children received an additional Axis I-diagnosis.

Measures

Dimensional Personality Symptom Item Pool for Children

In order to ensure a broad and comprehensive coverage of trait-related symptoms in our child psychiatric patients, we administered the Dimensional Personality Symptom Item pool for Children [DIPSI; 31] as a measure for personality symptomatology. To better represent trait-related maladaptive functioning in children, the authors formulated more extreme variants of adaptive personality items and supplemented them with items from adult personality disorder instruments that were judged to be applicable for children. In this way, both extreme endpoints of the adaptive personality factors were exhaustively covered. For example, the extremes of the dimension orderliness were explored by items as “always leaves everything lying around” (low orderliness) and “is obsessed by cleaning up everything” (high orderliness). The DIPSI consists of 172 items, formulated in the third person verb form, avoiding negations. Factor analyses of the DIPSI yielded four dimensions of personality symptoms that closely resemble the extremes of four of the five adaptive personality factors: Disagreeableness, Emotional Instability, Introversion and Compulsivity [31, 32]. Analyses of internal consistencies in the present sample demonstrate high to excellent reliabilities, yielding Cronbach’s alpha’s of 0.98, 0.95, 0.91 and 0.84 for the four factors, respectively.

Self-Perception Profile for Children

The Self-Perception Profile for Children [33, 34] is a widely used self-report measure of self-esteem for children aged between 8 and 12 years. The SPPC evaluates self-esteem in five relevant life domains: Scholastic Competence, Social Acceptation, Athletic Competence, Physical Appearance, and Behavioral Conduct, as well as a global feeling of self-worth, Global Self-Esteem. The SPPC consists of 36 items formulated as bipolar statements. Children choose for each item which statement applies to them and then indicate whether this statement is ‘sort of true’ or ‘really true’ for them. In order to obtain a multi-informant perspective, we administered the SPPC to the child as well as to one of its parents. The SPPC parent version is identical in form, content and scoring to the child version. Previous studies provided ample evidence for the reliability and validity of both scales [14, 33].

Achenbach’s System for Empirical Based Assessment [ASEBA]

Behavioral and emotional problems were assessed with the Dutch translation of the Child Behavior Checklist (CBCL/6–18) and the Teacher Report Form (TRF/6–18). These instruments probe with 3-point Likert scales the incidence of various problem behaviors in youth. Both reliability and validity of this widely used measure of problem behavior are well established [9, 44]. Our study only addresses the two broad-band dimensions of the ASEBA classification system: internalizing and externalizing problem behavior.

The Strengths and Difficulties Questionnaire

The Dutch version of the Strengths and Difficulties Questionnaire [SDQ; 45, 46] comprises 25 short statements rated on three-point scales. The SDQ consists of four problem scales: Emotional Symptoms, Conduct Problems, Hyperactivity and Peer Problems; as well as one adaptive scale, Prosocial Behavior. Our analyses only focus on the ‘internalizing’ scale Emotional Symptoms, and the Conduct Problems and Hyperactivity scales, which entail more ‘externalizing’ items. The Dutch SDQ-version has recently been validated for the Flemish child population [46].

Procedure

We administered the Dimensional Personality Symptom Itempool, the parent version of the Self-Perceived Profile for Children, the Child Behavior Checklist and the Strengths and Difficulties Questionnaire to one of the parents. These questionnaires were mostly completed by the mother (80%), in some instances the father (20%). The children provided self-ratings on the SPPC. Teachers supplied additional evaluations of behavioral and emotional problems on the Teacher Report Form and on the Strengths and Difficulties Questionnaire.

Results

Implementation of the PCA Strategy to Aggregate Multi-Informant Data

Table 1 presents descriptive statistics (means and standard deviations) of the parent, child and teacher reports on the four questionnaires and the agreement among judges for self-esteem and psychopathology. Moderate to fair agreement is found between self and parent reports of self-esteem as well as between parent and teacher ratings of psychopathology. Parallel to previous research [8–10], agreement is higher for externalizing than for internalizing behavior and is only modest for ASEBA Internalizing problems.

For each of the eleven constructs that were assessed by two informants (6 SPPC, 2 ASEBA and 3 SDQ scales), subscale scores for each pair of raters (e.g., parent- and self-rated SPPC Social Acceptance) were entered as variables in an exploratory principal component analysis to extract the first principal component.¹ This extracted principal component reflects the common core of both ratings on each subscale and the resulting composite scores were saved as a new variable. Missing values were replaced by means.

As expected, these composites explain substantial parts of variance across informants, accounting for on average 72% of the variance across parent-self ratings on the six SPPC

¹ In the present sample, the ratio of N to the number of observed variables involved in the research problem (p) equals 30:1 ($=60:2$) and hence more than meets the varying guidelines recommending that this ratio should be in the 2:1–20:1 range to guarantee stable PCA solutions [47–50]. Recent research, however, demonstrates the limited value of these traditional rules-of-thumb and points to the critical role of communalities across the p variables in order to achieve a stable recovery of population components [48–50]. More in particular, it is specified that when communalities are high (benchmark set at 0.6), recovery of population factors from sample data is normally very good, even for samples much smaller than traditionally recommended [48–50]. Because the communalities across all eleven pairs included in the PCA are consistently high (all greater than 0.6), the included sample size can be considered as more than adequate for conducting principal component analysis.

Table 1 Descriptive statistics and inter-informant correlations for self-esteem and psychopathology

	Means (SD)			Agreement	
	Parent	Child	Teacher	Parent–child	Parent–teacher
SPPC (<i>N</i> = 56)					
Scholastic competence	15.4 (4.7)	17.1(4.8)		0.33**	
Social acceptance	15.1 (5.1)	16.8 (4.8)		0.45**	
Athletic competence	16.0 (4.9)	17.3 (4.4)		0.72**	
Physical appearance	17.8 (5.7)	19.2 (5.1)		0.44**	
Behavioral conduct	13.5 (4.5)	16.2 (4.6)		0.38**	
Global self-esteem	14.7 (5.0)	18.8 (4.7)		0.57**	
ASEBA (<i>N</i> = 59)					
Internalizing problems	18.4 (11.5)		11.5 (8.3)		0.11
Externalizing problems	18.3 (11.1)		13.6 (12.8)		0.35*
SDQ (<i>N</i> = 41)					
Emotional symptoms	5.0 (2.8)		3.3 (2.9)		0.41*
Conduct problems	3.6 (2.4)		2.5 (2.6)		0.73**
Hyperactivity	6.6 (2.6)		5.2 (3.6)		0.59**
DIPSI (<i>N</i> = 58)					
Disagreeableness	2.7 (0.9)				
Emotional instability	2.6 (0.8)				
Introversion	2.1(0.7)				
Compulsivity	2.0 (0.7)				

* $p < 0.05$; ** $p < 0.01$

scales (ranging from 65 to 80%) and on average 70% of the variance across parent-teacher reports on the five problem behavior scales. In the subsequent analyses, we compare the results obtained with these composite scale scores with those obtained by a single and common rater.

Bivariate Correlations

Bivariate correlation analyses address the relationships of personality symptoms and self-esteem with problem behavior and are shown in Table 2. Relying on the parent as the single common rater (left side of Table 2) reveals robust differential patterns of correlations among personality symptoms, self-esteem and psychopathology. The two internalizing problem scales, ASEBA Internalizing and the SDQ Emotional Symptoms scale, are exclusively associated with the DIPSI dimensions Emotional Instability ($r = 0.64$ and $r = 0.64$) and Introversion ($r = 0.67$ and $r = 0.48$). The three externalizing scales, i.e. ASEBA Externalizing and the SDQ-scales Conduct Problems and Hyperactivity, strongly correlate with the DIPSI domain Disagreeableness ($r = 0.77$, $r = 0.66$ and $r = 0.62$). In addition, the SDQ-scale Hyperactivity negatively correlates with DIPSI Compulsivity ($r = -0.38$). The Externalizing ASEBA-domain also has two moderate, unexpected positive correlations with Emotional Instability ($r = 0.33$) and Introversion ($r = 0.30$).

With one common rater, self-esteem is also significantly associated with psychopathology. Both internalizing scales correlate primarily with Global Self-Esteem ($r = -0.64$

Table 2 Correlations of personality symptoms, self-esteem with psychopathology, based on single rater or composite scores

	Single and common rater				PCA composites			
	ASEBA		SDQ		ASEBA		SDQ	
	Internal	External	Emo Sy	Cond Pr	Internal	External	Emo Sy	Hyperact
DIPSII								
Disagreeableness	0.03	0.77***	0.13	0.66***	-0.12	0.63***	-0.17	0.57***
Emotional instability	0.64***	0.33*	0.64***	0.06	0.48***	0.17	0.50***	0.01
Introversi	0.67***	0.30*	0.48**	0.04	0.54***	0.19	0.47**	0.07
Compulsivity	0.23	0.08	0.02	-0.24	0.12	-0.03	-0.01	-0.20
SPPC								
Scholastic competence	-0.11	-0.10	-0.31	-0.12	-0.15	-0.10	-0.43**	-0.03
Social acceptance	-0.43**	-0.17	-0.13	-0.14	-0.37**	-0.07	-0.32*	-0.07
Athletic competence	-0.45***	-0.10	-0.29	-0.05	-0.27	-0.04	-0.37*	0.02
Physical appearance	-0.46***	-0.15	-0.31	-0.06	-0.15	-0.09	-0.38*	-0.06
Behavioral conduct	-0.14	-0.58***	-0.03	-0.67***	0.10	-0.53***	0.01	-0.56***
Global self-esteem	-0.64***	-0.29*	-0.36*	-0.09	-0.36**	-0.05	-0.51***	0.07

The single and common rater is the parent. SPPC composites are derived from parent and self reports, composites for ASEBA and SDQ from parent and teacher reports. Only parents provided DIPSII ratings

ASEBA Achenbach's system of empirically based assessment, *Internal* internalizing, *External* externalizing, *SDQ* strengths and difficulties questionnaire, *Emo Sy* emotional symptoms, *Cond Pr* conduct problems, *Hyperact* hyperactivity, *DIPSII* dimensional personality symptom itempool for children, *SPPC* self perception profile for children

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

and $r = -0.36$). The ASEBA Internalizing domain also relates to lower appraisals of children's Physical Appearance ($r = -0.46$), Athletic Competence ($r = -0.45$) and Social Acceptance ($r = -0.43$). Externalizing scales typically correlate negatively with Behavioral Conduct (r ranges from -0.58 to -0.67). The Externalizing ASEBA-domain is also negatively related to Global Self-Esteem ($r = -0.29$).

The correlations between parental reports of personality symptoms and composite scores of self-esteem (parent, self) and psychopathology (parent, teacher) are shown at the right side of Table 2. Although most correlations decrease in absolute value, there remains remarkably strong evidence for a differential pattern of relationships between personality symptoms and combined adult reports of problem behavior. ASEBA Internalizing and SDQ Emotional Symptoms are again uniquely and positively correlated with DIPSI Emotional Instability ($r = 0.48$ and $r = 0.50$) and Introversion ($r = 0.54$ and $r = 0.47$). ASEBA and SDQ-assessed Externalizing are again highly related to DIPSI Disagreeableness ($r = 0.63$, $r = 0.57$ and $r = 0.54$). The composite SDQ-scale Hyperactivity is characterized by a negative correlation with DIPSI Compulsivity ($r = -0.39$).

Correlations between combined reports on self-esteem and composite psychopathology also reflect the pattern based on reports by a single and common informant. Internalizing scales are again negatively associated with Global Self-Esteem ($r = -0.36$ and $r = -0.51$). This time, however, it is the composite SDQ-scale Emotional Symptoms that relates to negative appraisals on other Harter scales, viz. Scholastic Competence ($r = -0.43$), Physical Appearance ($r = -0.38$), Athletic Competence ($r = -0.37$) and Social Acceptance ($r = -0.32$). The Internalizing ASEBA-domain has one supplementary negative correlation with Social Acceptance ($r = -0.37$). The three externalizing scales are again exclusively and negatively associated with Behavioral Conduct (r ranges from -0.53 to -0.56).

Incremental Validity

Table 3 reports the hierarchical regression results comparing the incremental validity of DIPSI and SPPC dimensions as predictors of psychopathology, entering DIPSI and SPPC scales at the first and second step and vice versa. The left side of Table 3 presents the relative contribution of DIPSI and SPPC relying on the parent as the single and common informant. The DIPSI-domains explain between 46 (SDQ Emotional Symptoms) and 62 (ASEBA Externalizing) percent of the variance of the different psychopathology scales. Adding the SPPC to the DIPSI does not increment predictive validity. Regressing psychopathology first on the SPPC-dimensions showed that the SPPC-scales explained between 24 (SDQ Emotional Symptoms) and 53 (SDQ Conduct Problems) percent of the variance. Adding the DIPSI-dimensions in the second step significantly increases the percentages from 25 (CBCL Internalizing) to 34 (SDQ Hyperactivity), except for the Conduct Problems SDQ-scale. Overall, the personality symptom model proved, based on common rater reports, to be superior to the self-worth model in predicting psychopathology. Together, the two models explained between 54 and 73% of problem behavior variance.

We also explored whether the DIPSI- and SPPC-dimensions significantly predict psychopathology in the first step of the regression analyses. DIPSI Emotional Instability, Introversion and low Disagreeableness predict the Internalizing ASEBA-domain, while DIPSI Emotional Instability predicts SDQ Emotional Symptoms. DIPSI Disagreeableness explains all three externalizing scales. Low DIPSI Emotional Instability additionally predicts SDQ-Conduct Problems while low DIPSI Compulsivity is predictive for the SDQ-

Table 3 Hierarchical multiple regression results of personality on personality symptoms and self-esteem based on single rater or composite scores

	Single and common rater					PCA composites					Final R^2
	R^2 change step					R^2 change step					
	1	2	1	2		1	2	1	2		
	DIPSI	SPPC	SPPC	DIPSI	DIPSI	DIPSI	SPPC	SPPC	DIPSI	DIPSI	
ASEBA											
Internalizing problems	0.59***	0.10	0.44**	0.25**	0.69***	0.39***	0.05	0.30**	0.14	0.44***	
Externalizing problems	0.62***	0.05	0.37**	0.30**	0.66***	0.43***	0.14*	0.38***	0.19**	0.57***	
SDQ											
Emotional symptoms	0.46***	0.08	0.24	0.30	0.54*	0.46***	0.11	0.46**	0.11	0.57***	
Conduct problems	0.56***	0.10	0.53***	0.13	0.66***	0.47***	0.17	0.51***	0.13	0.64***	
Hyperactivity	0.60***	0.14	0.39*	0.34**	0.73***	0.49***	0.08	0.41*	0.16	0.57**	
Mean R^2	0.57	0.09	0.39	0.26	0.67	0.45	0.11	0.41	0.15	0.56	

The single and common rater is the parent. SPPC composites are derived from parent and self reports, composites for ASEBA and SDQ are obtained from parent and teacher reports. Only parents provided DIPS ratings

R^2 additional variance accounted for at each step, ASEBA Achenbach's system of empirically based assessment, SDQ strengths and difficulties questionnaire, DIPS dimensional personality symptom itempool for children, SPPC self perception profile for children

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

scale Hyperactivity. Only two of six Harter scales predict maladjustment. Low SPPC Global Self-Esteem explains the Internalizing ASEBA-domain while SPPC Behavioral Conduct is the sole negative predictor of the three externalizing scales. None of the SPPC dimensions explains SDQ-Emotional Symptoms.

Finally, we investigated the incremental validity of DIPSI- and SPPC-dimensions based on the common core of information extracted by PCA (right side of Table 3). Although the proportions of explained variance are lower than with a single and common rater, both DIPSI- and SPPC-dimensions still capture a substantial amount of the psychopathology variance. DIPSI-dimensions explained between 39 (ASEBA Internalizing) and 49 (SDQ Hyperactivity) percent of the variance in psychopathology. SPPC-scales captured between 30 (ASEBA Internalizing) and 51 (SDQ Conduct Problems) percent of the problem behavior scale variance. Both SPPC-scales and DIPSI-dimensions contribute to the prediction of ASEBA Externalizing: SPPC- and DIPSI-dimensions account respectively, for an additional 14 and 19%.

Again, investigating the predictive value of DIPSI- and SPPC-dimensions shows differential relationships of DIPSI-dimensions to problem behavior. As expected, high Disagreeableness predicts all externalizing scales while low Disagreeableness predicts both internalizing scales. DIPSI Emotional Instability predicts both internalizing scales, but is also a negative predictor of SDQ Conduct Problems. Additionally, DIPSI Introversiveness predicts the ASEBA Internalizing domain. Compared to the regression analysis based on the common rater data, DIPSI Compulsivity is no longer a significant predictor of SDQ Hyperactivity. Furthermore, three of six Harter scales now predict psychopathology. The most prominent predictor, SPPC Behavioral Conduct, differentiates between internalizing and externalizing scales. Low Behavioral Conduct exclusively predicts externalizing, whereas high scores on Behavioral Conduct predict ASEBA- and SDQ-assessed internalizing scales. Finally, low Global Self-Esteem explains ASEBA Internalizing, whereas low perceived Scholastic Competence is the most prominent predictor of SDQ Emotional Symptoms.

Discussion

This study examined whether personality symptoms and self-esteem are meaningfully linked with psychopathology in a child psychiatric sample, based on data from multiple sources. We hypothesized that prior research overstated the role of personality as an indicator of problem behavior, as most research explored these relations based on data provided by a single informant [17–25]. Self-esteem research however, primarily linked child reports of self-competencies to parent reports of psychopathology [7, 34–36] and hence may have underestimated the predictive value of self-esteem. To obtain more reliable and valid assessments of associations, we evaluated principal component analysis as a strategy to combine the common core of ratings rendered by multiple informants [12, 29, 30] and compared this with the traditional single informant approach.

First, when personality symptoms, self-esteem and psychopathology were rated by a single and common rater (the parent), we found strong and differential associations between two psychopathology measures, CBCL and SDQ on the one hand, and DIPSI personality symptoms and SPPC self-esteem on the other. Clearly, when predictor and criterion assessments were based on PCA-composite scores derived from multiple informants (parent-teacher, parent-child), these strong relationships persisted. Most correlations decreased but remained significant and the observed differential pattern of correlations was

robust: internalizing problems were predominantly associated with DIPSI Emotional Instability and Introversion and with low SPPC Global Self-Esteem whereas externalizing problems were related to DIPSI Disagreeableness and negatively to SPPC Behavioral Conduct.

The retrieval of this pattern with both informant strategies corroborates the broad picture of relationships emerging from the growing personality/psychopathology literature [16–30]: internalizing problems are primarily related to Neuroticism and Introversion, whereas externalizing problems are negatively related to Agreeableness and Conscientiousness. In addition, the present study supports the validity of the DIPSI as a measure of personality symptomatology in referred children and corroborates its links with psychopathology [31, 32] by including multiple informant reports of problem behavior. With regard to self-esteem, the present study collected and combined self-esteem ratings provided by multiple informants (parent and self) and obtained stronger correlations between self-esteem and psychopathology than reported in prior research [7, 34, 35]. These latter studies did not adopt parental reports of self-esteem, partly based on the assumption that self-worth refers to internal states that are not readily observable for others [7]. However, our study confirms that parents and children agree fairly well and establishes self-esteem as a valid indicator of childhood psychopathology, both relying on a common rater and on a combined informant strategy.

Second, we compared the incremental contribution of personality symptoms versus self-esteem as predictors of childhood problems, based on the two strategies. Relying on a common rater strategy, the personality symptoms model and the self-esteem model jointly account for a large amount of variance in psychopathology. When the composites were included, the proportions attenuated but remained significant. With common rater data, personality symptoms account for an additional 25–34% of the problem behavior variance beyond the SPPC self-esteem prediction. Interestingly, with the composite strategy, the incremental advantage of the DIPSI was no longer significant except for predicting externalizing problems beyond SPPC-based predictions. The fact that the incremental advantage of the DIPSI as predictor of problem behavior virtually disappears when self-esteem and psychopathology are derived from multiple sources presumably reflects the bias introduced by collecting predictor and criterion scores from the same informant, in this case the parent. In addition to this common rater inflation, however, it is also possible that cross-setting variance attenuates effect sizes obtained by the PCA-composite strategy.

Noticeably, the regression analyses provided additional support for the robustness of the pattern of relationships postulated before. With the common rater strategy, all four DIPSI-dimensions proved to be significant predictors, whereas only two of the six Harter-scales predicted problem behavior. This pattern persisted with the composite strategy, confirming these links across informants. The predictive value of DIPSI Disagreeableness and SPPC Behavioral Conduct for internalizing problems was unexpected, but may be clinically relevant. Caregivers typically describe internalizing children as submissive and compliant or as children who don't speak out for themselves and are pushed aside by others. DIPSI Emotional Instability also negatively predicts SDQ Conduct Problems. In adult literature high Emotional Stability is strongly associated with antisocial behavior and particularly with psychopathy, one of the severest adult disorders. This parallel association in childhood is nevertheless based on cross-sectional data and hence requires replication with longitudinal research.

A final evaluation of the two informant strategies pertains to the total amount of explained criterion variance (Final R^2). When a single and common rater provides all ratings, the squared multiple correlations range from 0.54 (SDQ Emotional Problems) to

0.73 (SDQ Hyperactivity) with an average of 0.67. When problem behavior and self-esteem are derived from composite scores, the multiple correlations range from 0.44 (ASEBA Internalizing) to 0.64 (SDQ Conduct Problems), averaging 0.56. By contrast, when data are provided by three different raters, the multiple R 's reduce even more in size, ranging from 0.22 to 0.61, with an average of 0.45. Averaging the ratings of multiple informants produced multiple R 's ranging from 0.17 to 0.58, with an average of 0.37. These additional analyses show that composite scores have a clear advantage over the use of single raters and over simple averaging of scores provided by multiple raters.

Taken together, our study provides further evidence for using principal component analysis to derive more reliable and valid indicators based on multiple informant data. Moreover, the present study adds to previous research [12, 29, 30] by implementing this technique in a clinical sample of child psychiatric patients targeting multi-informant assessment of both self-esteem and problem behavior. In many research settings, there is no single source of information guaranteeing valid measurement of a characteristic. Therefore, the potential utility of this technique extends far beyond the field of self-esteem, psychopathology or personality. Future research might apply such a strategy when data can not solely be derived from objective behavioral measures (such as measurements of reaction time, grade point averages or intelligence tests, direct expert observations) but has to rely on multiple informants as subjective sources of information. For example, this technique can be used to combine self and peer ratings of job performance, father and mother reports of child behavior, child and parental appraisals of parenting, patient and caregiver perceived quality of residential care.

Some methodological and conceptual limitations restrict the generalizability of the present findings. Our conclusions are constrained by the relatively modest sample size and by the particular choice of sets of informants and instruments to measure self-esteem, personality symptoms and psychopathology. One could also raise questions about content overlap between psychopathology measures and personality symptoms. However, recent empirical research on the overlap between the DIPSI and the CBCL-items [32] shows that although there is some item overlap, it does not affect the basic pattern of correlations. Finally, the central conceptual hypothesis of the present research is that personality symptoms and self-esteem co-determine psychopathology. In essence, this is a causal hypothesis that cannot be fully addressed in a cross-sectional study but should be corroborated by multi-wave longitudinal research.

Summary

Studying personality and self-esteem as indicators of childhood psychopathology lacks a preferred strategy to combine data from multiple informants. Recently, principal component analysis (PCA) is introduced as a strategy for extracting the common core from multi-informant ratings, resulting in an improved assessment in terms of reliability and validity. The present study adopted this approach to study the effects of personality and self-esteem on psychopathology in a clinical sample of 60 child psychiatric patients (42 boys), with a mean age of 10.6 years and compared it to the traditional strategy of relying on a single informant. Personality symptomatology was only rated by the parent whereas two different informants evaluated self-esteem (parent and child) and psychopathology (parent and teacher). Implementing PCA to extract the common core from these multiple ratings of self-esteem and psychopathology yielded composite subscale scores that explained most part of variance across informants. Markedly, comparing these PCA-based composite

scores with single and common rater data shows that, although adopting composites attenuates the absolute values of the indicators, the basic pattern of differential relationships is preserved. For both strategies, correlation analyses and hierarchical regression results affirm the robustness of the following pattern: Global Self-esteem, Introversion and Emotional Instability are major indicators of internalizing problems, whereas Behavioral Conduct and Disagreeableness primarily predict externalizing psychopathology. These findings corroborate the broader picture emerging from analyses based on common rater reports and illustrate how multiple informant reports can be integrated to study self-esteem in relation to psychopathology. The present study shows that PCA-based composite scores have a clear advantage over the use of single raters and over simple averaging of multiple source data, further establishing the viability of this strategy for valid assessments of characteristics of children.

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